D5 - Embedded GUI

Graphical User Interfaces for Embedded Linux

Objectives

- Understand the different layers associated with the graphic interface system
- Learn how to use the Linux frame buffer
- Discover the hardware abstraction layers
- Learn to use the main graphical toolkits (widgets) taretting embedded Linux
  - QT
  - FLTK
  - WxEmbedded
  - MiniGUI
  - ...
- Learn how to link commands to GUI elements

Labs are conducted using the System Workbench for Linux - Basic EditionIDE.

Hardware

- A Linux PC for two trainees, with an ARM based target board
- Course material
- CDROM with documentation and tools used during the trainin

Prerequisites

- Knowledge of Linux user level programming (D0 - Linux user mode programmingcourse)
- Knowledge of embedded Linux (D1 - Embedded Linux with Buildroot and Yoctocourse)

Course Environment

- Theoretical course
  - PDF course material (in English) supplemented by a printed version.
  - The trainer answers trainees' questions during the training and provide technical and pedagogical assistance.
- At the start of each session the trainer will interact with the trainees to ensure the course fits their expectations and correct if needed

Target Audience

- Any embedded systems engineer or technician with the above prerequisites.

Course Outline

The various system layers used by GUIs

- Kernel drivers: frame buffer, direct access, ...
- Hardware abstraction layers: X, GGI, DirectFB, ...
- Graphical toolkits (widgets): QT, GTK, FLTK, ...
- Window manager: matchbox, sawfish, ...
- Desktop environments: GNOME, KDE, ...

The Linux frame buffer

- Selecting frame buffer support when building th ekernel
- Generic VGA support, VESA
- Provided features

The hardware abstraction layers

- X: standard server and embedded-specific versions (tiny-X, Kdrive, Nano-X)
- GGI: generic multiplatform GUI (Linux, Windows, MacOS/X ,...)
- DirectFB: hardware acceleration above the frame buffer

The graphic toolkits (widgets)

- Trolltech's QT
- GTK (Gimp ToolKit)
- WxEmbedded
- FLTK (Fast Light ToolKit)
- MiniGUI
- Nano-X (ex MicroWindows)
- Standard "desktop" versions and embedded-specific versions
- Graphical GUI design tools: QT designer, Glade, FLUID...

Linking commands to GUI items

- Using fork and exec
- Pipe communication
- Integration with widgets

Embedded GUI distributions for Linux

- The "familiar project"
- GPE Palm Environement
- Qtopia
- Pixil